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BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

MOUNTAIN PINE BEETLE INFESTATIONS IN THE
WHITE PINE STANDS OF THE COEUR D'ALENE NATIONAL FOREST

By

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INTRODUCTION

Artificial control measures were conducted within the Coeur d'Alene Forest during the spring of 1929 for the reduction of an outbreak of the mountain pine beetle (*Dendroctonus monticolae*) in the white pine stands of the Steamboat drainage of the Coeur d'Alene River. At the time this project was planned it was felt that conditions within adjacent drainages might prove to be as serious as those within the contemplated control area, but at that time a more extensive examination could not be made. To secure definite information relative to this possibility a reconnaissance of conditions within a large portion of the forest was conducted during the month of July. This survey was made by Messrs. Terrell and Furniss, temporary employees of the Bureau of Entomology, under the direction of the Forest Insect Field Station, Coeur d'Alene, Idaho.

Due to the size of the area to be covered by this reconnaissance and the time available for the work, it was necessary that it be very extensive in character. However, excellent data were secured which present very clearly the severity of the situation which now exists within the Coeur d'Alene National Forest.

(Reference is made to the report on the "Insect Survey of East Fork of Steamboat Creek, Coeur d'Alene National Forest", dated November 22, 1928. For detailed information relative to the method of control recommended for this project reference is made to the "Plan of Operation for Control of Mountain Pine Beetle Outbreaks in White Pine", issued from the Forest Insect Field Station, February 16, 1929).

1929 INSECT RECONNAISSANCE

The purpose of this survey was to secure a more accurate knowledge of the status of the mountain pine beetle within the white pine stands of the forest. As this survey was conducted during July, and at a time when there was no foliage discoloration of the newly attacked trees, it was necessary to limit the data secured to the 1928 infestation which appeared as "red-tops" at the time. Data secured from surveys of this character, which are called "red-top surveys", consist of the number of trees killed the previous year, and their approximate location within each drainage. These red-top trees are counted from all possible vantage points and their number and location recorded upon a large-scale map. Though trees occurring in small groups can be easily counted, difficulty is experienced in determining the actual number of red-tops which occur in larger groups. This condition can be overcome by intensively cruising several small areas after the red-tops within them have been counted from a distance and applying the correction factor thus obtained to all of the data secured.

The severest criticism which can be offered against the practice of red-top surveys is that the data secured are always one year behind the current year's infestation, which is a handicap in planning for the institution of control. This objection is met by correcting the data secured with an estimate of the increase or decrease in the infestation which is based upon the condition of the overwintering broods within the red-tops. Red-top surveys are not intended for the securing of intensive

data, and are for preliminary reconnaissance only. There is no other way by which a general idea of conditions within a large area can be secured as quickly and economically. This survey has given the information desired, and presents quite clearly the seriousness of the situation.

RESULTS OF RECONNAISSANCE

The data secured from the July survey can be subdivided somewhat as follows.

Table of Units Covered by Survey

Area	Red-tops Actually Counted	Estimated No. of Red- tops Based on Cor- rection Factor
	<u>Trees</u>	<u>Trees</u>
	Steamboat Unit	
East Fork of Steamboat	269	358
West Fork of Steamboat	194	262
Can Creek	383	510
Omaha Creek	125	167
	Cougar Unit	
Cougar Gulch	357	476
	Magee Unit	
Stewart and Potter Creeks	798	1064
Big Elk Creek	335	447
	Yellow Dog Unit	
Yellow Dog and Downy Creeks	1145	1537
Little Guard Peak	617	823
	Flat Creek Unit	
Flat Creek	360	480
	Brett Creek Unit	
Brett and Miner Creeks	215	287
	Rock City Unit	
Rock City Unit	637	849
	Little North Fork Unit	
Little North Fork above Cascade Creek	600	800

To the actual number of red-tops counted a correction factor of 33 per cent has been added to compensate for the trees missed within the larger groups, as well as those which were so located that they could not be seen by the observer. In considering the character of this survey which was of necessity very extensive, it will be realized that a large number of trees must have been missed by the observers, which would seem to make the above correction factor a very fair one.

In computing the actual number of red-tops counted there is another factor which we are obliged to consider at this time. The season of 1928 was a very long one which permitted the broods in some of the early attacked trees to reach maturity and to emerge and attack other trees late last fall. These 1928 attacked trees from which the insects had emerged appeared as red-tops at the time of the survey and were very difficult to distinguish from those which carried insect broods over the winter. Though these trees would be included in the 1928 loss, they would not be considered in computing the number of trees to be treated during a spring operation. Furthermore, during a July survey they could not be considered as potential sources for the 1929 infestation as this would give an inflated value to the loss. The number of red-tops counted has therefore been reduced by 10 per cent, which is approximately the percentage of these trees found during the 1929 control operations.

To secure an estimate of the severity of the 1929 infestation, it is necessary to use the 1928 loss as a base, corrected with what is believed will be the natural increase or decrease in the infestation. The conditions of the overwintering broods often serve as an indication of the course which the infestation will take. In making such a computation we are again obliged to deal with an uncontrollable factor, which is the flight mortality of the mature beetles which occurs between the time of their emergence and the new attack. In consideration of all these factors it is estimated that the increase from the 1928 infestation to the 1929 will be at a ratio of 1 : $2\frac{1}{2}$. Table of units with corrected 1928 loss and estimated 1929 infestation follows.

Table of 1928 and 1929 Losses

Area	Corrected 1928 Loss	Estimated 1929 Infestation
	<u>Trees</u> <u>Steamboat Unit</u>	<u>Trees</u>
East Fork Steamboat	323	807
West Fork Steamboat	236	590
Can Creek	459	1147
Omaha Creek	151	377
	<u>Cougar Unit</u>	
Cougar Creek	429	1072
	<u>Magee Unit</u>	
Stewart and Potter Creeks	958	2395
Big Elk Creek	403	1007
	<u>Yellow Dog Unit</u>	
Yellow Dog and Downey Creeks	1384	3460
Little Guard Area	741	1852
	<u>Flat Creek Unit</u>	
Flat Creek	432	1080
	<u>Brett Creek Unit</u>	
Brett and Miners Creeks	259	645
	<u>Rock City Unit</u>	
Rock City Unit	764	1910
	<u>Little North Fork</u>	
Little North Fork above Cascade Creek	720	1800
	7,073	18142

This table gives a total of 18,142 trees attacked in 1929 within the units listed. It is believed that this is a conservative

estimate, and that an actual survey of these units would show a larger number. Furthermore, the exact status of conditions throughout the entire forest is not known, but it is rather safely assumed that practically every white pine stand within the forest supports an infestation of near epidemic proportions.

PLAN OF CONTROL

It is very evident that a situation exists on the Coeur d' Alene Forest which, if not reduced through natural or artificial means, will result in the destruction of a tremendous volume of white pine stumpage. Not only will a heavy loss of merchantable white pine occur, but thousands of snags will be scattered throughout the forest which will greatly increase the difficulties of fire suppression. There are infestations within practically every white pine stand of the forest that should be considered in the light of potential epidemics, regardless of their status at this time. It is impossible to foresee the future of this outbreak, though from the condition of the overwintering broods there is no reason to expect a natural decline for at least two years. It would seem that any plan of control adopted for this forest should include all of the more heavily infested areas during the first year of control. It is now known that the adult mountain pine beetles are capable of traveling rather long distances. Though an outbreak of this character can hardly be likened to the spreading epidemic of the mountain pine beetle which now exists

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in Montana, it is very evident that if satisfactory results are to be obtained through the institution of artificial control measures a broad and comprehensive program must be instituted. The institution of control within individual drainages will undoubtedly tend to reduce the infestation in proportion to the amount treated, but it is evident that if the outbreak continues the insects will sweep into such areas from the uncontrolled ones adjacent and defeat the results obtained by control.

The thoughts of reducing this epidemic through artificial control measures offers a rather difficult administrative problem. The terrain is a rough and rugged one, and during the spring of the year is made very inaccessible by snow and high water. The control of barkbeetle epidemics is an expensive procedure. Not only are large sums of money required, but during the course of the epidemic a tremendous volume of timber is destroyed and regardless of how successful the project may be, no assurance can be given that another outbreak will not occur in a few years. The elimination of insect depredations within our forests lies far more economically within the thoughts of preventing epidemics rather than controlling them. It is sincerely believed that when all trees infested with the mountain pine beetle are regarded in the light of potential outbreaks and promptly treated, destructive epidemics of this insect will be eliminated from our forests. In the past we have judged the economics of our expenditures for insect control on the cost per tree or board foot treated, and little attention has been given to the timber volumes or acreage protected.

In planning for the institution of control measures within the Coeur d'Alene Forest it would seem that in addition to combating the existing epidemic plans should be formulated for the prevention of further outbreaks of this destructive insect. Epidemic or near epidemic conditions exist in many areas which should be reduced to a normal status as quickly as possible. Two or three years may be required to accomplish this reduction in the general infestation, the time depending largely upon the intensity with which control work is instituted. When the existing epidemic has been successfully reduced and normal or endemic conditions exist within the forest, an intensive system of maintenance control should be inaugurated in order to protect past expenditures of funds, and to prevent a recurrence of the outbreak. Space will not be taken within this report for a discussion of such a plan of maintenance control; however, it would seem to be an uneconomical procedure to institute a project of such magnitude without realizing the necessity of preparing for protective measures following the cessation of the epidemic. The writer sincerely believes in the possibilities of maintenance control when applied to large areas, and feels that it will be from such work that losses from barkbeetle outbreaks will be most economically prevented.

RECOMMENDATIONS FOR INSTITUTION OF CONTROL

For the purpose of instituting artificial control measures within the Coeur d'Alene National Forest, it is recommended that the sum of \$110,000 be allotted for the fiscal year 1930. It is further recommended

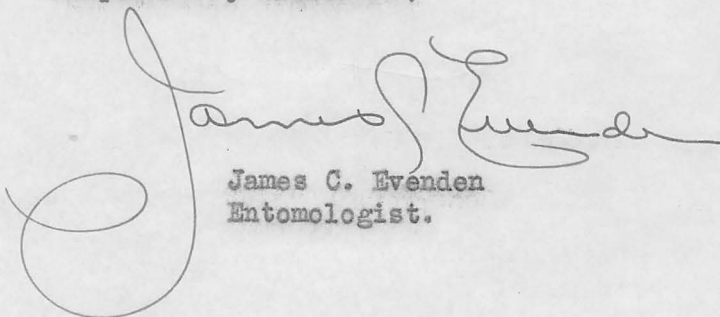
that as much as possible of this allotment be made available immediately in order that fall control work can be instituted in order to relieve the congestion and expense of spring operations. The institution of fall control will be a departure from the past practice of spring operations. It is possible that during fall operations considerable difficulty will be experienced in removing the bark from the infested trees, but it is believed that this increased cost of treating will be more than compensated by the decreased charges for transportation, camp establishment, etc., due to adverse weather conditions encountered during April and May. The sum of money requested for the treatment of the infested trees within the units mentioned is based upon the past season's operative cost, which was approximately \$6.00 per tree. It is possible that this cost can be reduced but at this time it is the only data available upon which such recommendations can be based. It is realized that this is a large appropriation, and the difficulties of administering such a sum in the time available for control work are appreciated. It is possible that some of the units listed could be eliminated from the control plan during the first year. However, all the units are more or less contiguous with each other and the elimination of any one of them would not add to the efficiency of the plan. The writer feels that the infestation within all of these units, and perhaps several others, will need to be treated before conditions in the forest can be restored to a normal status, and it would be advisable to care for as many of them as possible during the first year

of control. Under such a plan the epidemic will be reduced to a normal status more quickly, with a smaller expenditure of funds and a greater saving of timber, and the danger of the treated units being reinfested from those left untreated will be reduced to a minimum.

Though it is hoped that it will not be necessary, the Magee and Little North Fork units could be best eliminated from this season's control plans, with the least danger of reinfesting the other areas, although no assurance could be given that this would not occur. The elimination of these two areas would make a reduction of some \$30,000 in the amount required for control. Such an elimination would be an unfortunate one, as valuable timber lands are at stake and much larger sums of money would no doubt be required to treat these units in 1931.

It is therefore recommended that the plan of control as outlined within this report be adopted and that the sum of \$110,000 be allotted for the fiscal year 1930.

Respectfully Submitted,



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